UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/018,821	06/09/2002	Robert Short	H0664/7002	2143

23628 7590 10/29/2007
WOLF GREENFIELD & SACKS, P.C.
600 ATLANTIC AVENUE
BOSTON, MA 02210-2206

EXAMINER	
NAFF, DAVID M	

ART UNIT	PAPER NUMBER
1657	

MAIL DATE	DELIVERY MODE
10/29/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/018,821	SHORT ET AL	
	Examiner	Art Unit	
	David M. Naff	1657	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-12,15 and 25-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3, 5-12, 15 and 25-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

An amendment of 8/13/07 amended claim 1, and canceled claims 16-24.

Claims examined on the merits are 1-3, 5-12, 15 and 25-32, which are all claims in the application.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Dependent claim 11 is unclear how claim 1 is further limited by requiring the surface to be suitable for use with cells of mammalian origin. The at least one keratinocyte required by claim 1 is a cell of mammalian origin, and since the cell is attached to the surface, the surface is inherently suitable for use with cells of mammalian origin. Claim 11 should be deleted. Claim 12 should be made dependent on claim 1 and "mammalian cells are" should be changed to --- at least one keratinocyte is ---.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, 6-12, 15 and 25-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over France et al (C2 on form 1449) in view of Mayes et al (6,150,459) and McAuslan (WO 87/05038), and if necessary in further view of Daw et al (C1 on form 1449).

The claims are drawn to a therapeutic vehicle adapted for application to acute or chronic cutaneous wounds comprising a cell culture surface having a carboxylic acid functionality of at least 5% to which at least one keratinocyte is attached, which is capable of

detachment from the culture surface and transfer to an acute or chronic cutaneous wound upon contact with a wound bed. The cell culture surface can be prepared by plasma polymerization of acrylic acid or a copolymer of acrylic acid and 1,7-octadiene to coat a substrate. The surface can have a carboxylic acid functionality of 5-20% or greater than 20%. Also claimed are methods for treatment of cutaneous wounds by using the therapeutic vehicle.

France et al disclose attachment of human keratinocytes to plasma copolymers (PCPs) of acrylic acid/octa-1,7-diene and allyl amine/octa-1,7-diene. The copolymer is formed on a substrate such as foil, or tissue culture wells or dishes to produce a surface containing acid functionality that binds the keratinocytes where the keratinocytes were successfully cultured (first sentence under "Discussion" on page 41). The percent acid functionality can be in the range of 5-20% or greater than 20%. For example, see paragraph bridging pages 37 and 38; under "Cell attachment assay" and under "Characterisation of PCPs" and Table 1 on page 38; under "Discussion" on page 41; and under "conclusions" on page 42. The response of human keratinocytes to natural and synthetic surfaces is of importance in wound care and healing (page 37, right col, first complete paragraph).

Mayes et al disclose coating the surface of a material with a copolymer, seeding the coating with cells, and implanting (col 16, lines 58-65) for tissue engineering (col 16, line 53). Also disclosed is wound-healing application (col 16, line 14).

McAuslan discloses forming an implant by applying to a substrate a hydrogel layer to which cells bind (page 5, lines 15-29).

Daw et al disclose a plasma copolymer surface of acrylic acid/1,7 octadiene and attachment of osteoblast-like cells to the copolymer surface. For example, see page 1718, under "Experimental procedure"; paragraph bridging the columns and Figure 3 on page 1720; Figures 5 and 6 on page 1722; under "Discussion" on page 1723; and under "Conclusions" on page 1724.

It would have been obvious to apply the keratinocyte-binding copolymer of France et al to a substrate for implanting as suggested by Mayes et al and McAuslan applying a cell-binding polymer to a substrate to provide an implant, which can be seeded with cells. The resulting implantable substrate containing bound kertatinocytes is a therapeutic vehicle as presently claimed, and is inherently capable of being applied to acute or chronic cutaneous wounds where the keratinocytes detach and transfer to a wound bed. Using the implantable substrate containing bound kertatinocytes to treat wounds as in dependent claims 25-31 would have been obvious from France et al disclosing that response of keratinocytes to surfaces is important in wound care and healing (page 37, right col, first complete paragraph), and Mayes et al disclosing wound-healing application of cells bound to a copolymer. Daw et al further disclose attachment of cells to plasma copolymer surfaces of acrylic acid/1,7 octadiene, and if needed would have further suggested the present invention. The copolymer characteristics and other conditions of dependent claims are disclosed

by the references, or are not sufficiently different to be unobvious from copolymer characteristics and conditions disclosed by the references.

Response to Arguments

Applicant's arguments filed 8/13/07 have been fully considered but they are not persuasive.

The amendment states that an important feature of the claimed therapeutic vehicle, if used to promote re-epithelialisation and wound healing, is the detachment of keratinocytes from the vehicle and re-location of the keratinocytes into the wound. The amendment urges that the combination of prior art references do not suggest this feature of the invention.

This argument is unpersuasive since the copolymer containing bound keratinocytes of France et al, when on a substrate to form an implant, is inherently capable of use for treatment of wounds and the keratinocytes are inherently capable of detaching from the copolymer when used for wound treatment. Moreover, the therapeutic vehicles of claims 1-3, 6-12, 15 and 32 would not have to be used for wound treatment where the keratinocytes detach, but can be used *in vitro* for culture of the keratinocytes. As to claims 25-31 that require a method of using the claimed vehicle for treatment of wounds, this use would have been obvious from France et al disclosing that keratinocytes are involved in wound healing, and Mayes et al disclosing wound-healing application of cells bound to a copolymer.

The amendment urges that France et al discloses PCP surfaces containing 2.3% carboxylic acid groups. However, as can be seen from Figure 3 on page 40, the amount of carboxylic acid groups can be 21% where France et al disclose that cells can be well attached, although in some cases cells are poorly attached.

The amendment urges that Daw et al discloses 3.0% COOH group surface composition (Table 1). However, the table also discloses 5.0% when acid content of the monomer is 50% when washed. Therefore, Daw et al does not suggest only 3.0% COOH group content.

The amendment urges that Daw et al and France et al do not disclose attachment, growth and detachment of keratinocytes. However, keratinocytes will inherently be capable of attaching, growing and detaching from an implantable substrate containing the cell binding copolymer of France et al. Furthermore, France et al bind keratinocytes to the copolymer surface, and the keratinocytes would have been expected to bind to the copolymer when on a substrate for implanting.

Mayers et al and McAuslan et al are not relied on to suggest plasma polymerization to obtain a polymer containing a carboxylic acid functionality of at least 5% since this is suggested by France et al, and if needed Daw et al. Mayers et al and McAuslan et al are relied on to suggest providing the polymer of France et al on a substrate for implanting. The motivation to implant the copolymer of France containing bound keratinocytes is to obtain the known function of keratinocytes in wound healing. The motivation to provide the

copolymer of France et al on a substrate as suggested by Mayers et al and McAuslan et al is to provide the copolymer containing keratinocytes in a form suitable for implanting to treat a wound.

Claim Rejections - 35 USC § 103

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1-3, 6-12, 15 and 25-32 above, and further in view of Yanagihara et al (4,693,799).

The claim requires propionic acid as the acid subjected to plasma polymerization to produce the cell culture surface.

Yanagihara et al disclose (col 6, lines 44-45 and line 58) producing a plasma polymerized film enriched in hydroxyl or carboxyl groups by plasma polymerizing an acid such as propionic acid.

When producing copolymer of France et al on an implantable substrate as set forth above, it would have been obvious to use propionic acid in place of the acrylic acid of France et al since Yanagihara et al suggest that propionic acid will provide the function of acrylic acid by disclosing plasma polymerization of propionic acid to produce a film containing carboxyl groups.

Response to Arguments

Applicants urge that Yanagihara et al do not supply elements stated to be missing in the rejection above. However, for reasons set forth above, elements are not missing that will make the claimed invention unobvious.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David M. Naff whose telephone number is 571-272-0920. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jon Weber can be reached on 571-272-0925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David M. Naff
Primary Examiner
Art Unit 1657

DMN
10/26/07